Remarks

The Applicants note with appreciation the withdrawal of the previous 35 U.S.C. §112 rejection. The Applicants also note with appreciation the withdrawal of the prior rejections under 35 U.S.C. §103.

The Applicants note the objection to the Title. The Title has, therefore been changed in accordance with the Examiner's helpful suggestion. The Applicants have also reviewed the entire Specification and made minor amendments to place it into contemporary form. Entry into the official file is respectfully requested.

Claims 15-19, 21, 22 and 24 stand rejected under 35 U.S.C. §103 over the hypothetical combination of Toshio and Rowan with Fujimoto. The Applicants note with appreciation the Examiner's detailed comments theoretically applying various aspects of the three references against the claims. The Applicants respectfully submit, however, that one skilled in the art would not make the hypothetical combination as set forth in the rejection and, in any event, the result of such a combination would still fail to teach or suggest the subject matter of the rejected claims. Details reasons are set forth below.

The production method for a PPT fiber of Fujimoto includes conditions in which the intrinsic viscosity is 0.4 to 1.5 (0.7 or more for the Applicants), the 1st heat roll temperature is 30°C to 80°C (Tg approximately 45°C + 10°C to 50°C for the Applicants), the 2nd heat roll temperature is 100°C to 160°C (90°C to 180°C for the Applicants), the 1st roll speed is 300 to 3,500 m/min (2,000 m/min or more for the Applicants), the drawing rate was 1.3 to 4 (drawing to a residual elongation of 40% for the Applicants), and the relax rate is 0.8 to 0.999, or the relax rate is 0.1% to 20% (6% to 20% for the Applicants).

The surface roughness of the 2nd heat roll is not disclosed in Fujimoto (matte surface at 1.5

to 8S for the Applicants).

The Applicants first provide a definition of the spinning rate in the Applicants' application and compare it with that of Fujimoto. The Applicants disclose a direct spinning/drawing method of drawing and heat-treating a filament after spinning continuously without winding. The method is illustrated in Figs. 1 and 2. The yarn guide (or yarn guiding) means the processing in the following step. A filament extruded out of a spinneret 1 is cooled by passing through a chimney 2, oiled by an oiling guide 3, and wound around a first heated roll 4 and, then, drawn between the first heated roll 4 and a second heated roll 5 and wound again. As described on page 11, Lines 29 and 30 of the Applicants' Specification, the spinning rate is a winding speed in the step before the filament is drawn and, thus equivalent to the peripheral velocity of the first heated roll 4. Alternatively, in Fujimoto, since the filament is also drawn between the first and second heated rolls, the spinning rate in Fujimoto is equivalent to the peripheral velocity of the first heated roll, according to the Applicants' definition.

Table 1 is a table comparing the experimental values in the Examples of Fujimoto (peripheral velocity of the first roll equivalent to spinning rate, relax rate, and spinning efficiency) with those of the Applicants.

Table 1. Comparison of experimental values between Fujimoto Patent and the Applicants

	First-roll peripheral velocity (m/min)	Relax rate (%)	Spinning efficiency	Comparison
Example 1	2100	3		Different in relax rate
Example 2	2000	3		Different in relax rate
Example 3	1000	4		Different in relax rate
Example 4	2000	4		Different in relax rate
Example 5	1840	7		Different in spinning rate
Example 6	1125	8		Different in spinning rate
Example 7	1840	7		Different in spinning rate
Example 8	1850	13		Different in spinning rate
Example 9	1900	13		Different in spinning rate
Example 10	1850	13		Different in spinning rate
Example 11	1840	7		Different in spinning rate
Example 12	1150	12		Different in spinning rate
Example 13	1600	12		Different in spinning rate
Comparative Example 1	2000	0		Different in relax rate
Comparative Example 2	1850	13	x	Different in spinning rate
Comparative Example 3	1850	13	x	Different in spinning rate
Comparative Example 4	1850	5		Different in relax rate
Comparative Example 5	4000	8	x	Not wound
Comparative Example 6	2000	-1		Different in relax rate
Comparative Example 7	2500	0		Different in relax rate

As shown in Table 1, none of the values in the Examples of Fujimoto satisfy the claimed production method. Only one filament in Comparative Example 5, which satisfies the requirements, prohibits winding. In contrast, the Applicants' method allows stabilized heat treatment at a high relax rate only by adjusting the surface roughness of the second heated roll used in the drawing and heat-treating step into a particular range. It is thus possible to reduce the elongation stress of the PTT fiber in the practical elongation range (10% or less) drastically (decrease in differential Young's modulus at an elongation of 3% to 10%) and provide the filament with a soft stretching property.

One of the reasons of the rejection is that use of a textured roll having a particular surface roughness is obvious over Rowan (surface roughness of conditioning roll: 35 to 120 μinch (ca. 0.89

to 3.05 μm), for the Applicants: 0.8 to 6.3 μm). The production method in Rowan, which seeks to produce a high-strength polyester tire yarn, makes a tire yarn less shrinkable consistently by relaxing heat treatment with the conditioning roll. There are differences in application and also technological concept between the Rowan and the Applicants' subject matter (low-shrinkage tire yarn in Rowan vs. improvement in soft stretching property by reduction of elongation stress in lower elongation range). Application of the Rowan method to Fujimoto is difficult because of the difference in application and technological concept, and cannot be used as a reference. The Rowan method, in which the filament is drawn in two steps for improvement in strength, gives only a high-modulus filament, which is opposite in property to the Applicants' fiber which has a favorable soft stretching property. Although the kind of polyester used is not disclosed definitely in Rowan, it seems that it is polyethylene terephthalate, based on the description of "polyethylene terephthalate" in column 3, lines 38 to 39 and an extrusion temperature of 299°C (Table 1). Accordingly, the raw material itself is also different from that used by the Applicants.

Toshio seeks to weave a cloth without twisting or sizing by using a synthetic fiber having a CF value of 10 to 100. The production method only includes interlacing and there is no description on the condition for producing the raw fiber. The fibers cited therein are only polyester and polyamide and the polyester means polyethylene terephthalate. On the other hand, as described in page 13, line 32 to page 14, line 10, the Applicants' method is not a simple interlacing treatment and, in the interlacing treatment, the fiber is subjected to an applied tension modified, before it is interlaced while relaxed and heat-treated. Thus, the Applicants' interlacing treatment improves the soft stretching property of a PTT fiber by relaxing and heat treating of the fiber at a high relax rate while forming a gradient in tension between before and after the interlacing nozzle by modifying the operational air pressure of interlacing nozzle. Thus, the Applicants respectfully submit that the

solicited claims are not obvious over the three references, whether taken individually or collectively.

As noted above, the rejection substantially takes the position that Fujimoto teaches the method of Claim 1 except for the second heated roll having a surface roughness of 1.5 S-8 S and intermingling to a specific CF value. The rejection turns to Rowan to fill the deficiency associated with the surface roughness and Toshio to fill the deficiency with respect to the specific CF value. In that regard, the Applicants note in connection with Fig. 3 of Fujimoto and page 8 of the Fujimoto specification that there is a first heated roll and a second heated roll. As noted in the rejection, Fujimoto does not refer to any surface roughness. The first roll is taught as being heated between 30 - 80°C, while the second roll is taught as being heated between 100 - 160°. Fujimoto specifically teaches in [0038] that when the roll temperature is less than 100° C the yarn is not crystallized sufficiently which means that it is not possible to obtain a fiber having the thermal stress, boil-off shrinkage and tenacity obtained by Fujimoto.

This is compared to Rowan which discloses, as shown in connection with Fig. 2 and columns 3 and 4 of the Rowan specification, that there is a first heated roll, a second pair of heated rolls, a third pair of heated rolls and a fourth pair of heated rolls. The first roll is said to have a mirror finish which means that it has an arithemetic mean roll surface roughness value (A_a) of between 2 and 10. The following rolls have a so-called matte finish with surface finish values (R_a) between about 35 to 120 microinches.

Table 1 in column 4 of Rowan teaches that not only are all of the rolls/roll sets heated, but provides teachings as to what those temperatures should be. The first roll is disclosed as having a heating temperature between 50 and 120° C, while the second set of rolls is disclosed as having a temperature less than 100° C. Column 4 at line 22 specifically teaches that if the second set of rolls has a temperature above 100° C, the final yarn tenacity and mechanical quality is "diminished."

By comparing the various teachings between Fujimoto and Rowan with respect to the first and second rolls, it can be seen that there are seriously divergent teachings that would lead one skilled in the art not to make the hypothetical combination. Specifically, the Applicants respectfully submit that one skilled in the art, when looking to Rowan, would have no incentive to select only the surface roughness numbers from the second heated roll and utterly disregard the corresponding temperature of the second roll. This is particularly true since the teachings of Rowan are exactly the opposite of teachings of Fujimoto. As noted above, Fujimoto recites that the temperature of the second roll should be greater than 100°C. In sharp contrast, Rowan explicitly teaches that the temperature should be less than 100°C. Moreover, what makes it completely confusing is that Rowan teaches that the yarn tenacity and mechanical quality will be diminished if the temperature is above 100°C, while Fujimoto says exactly the opposite, namely that the tenacity, boil-off shrinkage and thermal stress characteristics will be poor if the temperature is less than 100°C.

The Applicants respectfully submit that these opposed teachings would hardly cause one skilled in the art to combine Rowan with Fujimoto. The Applicants also respectfully submit that while the Applicants realize that the rejection is not based on the temperature of the second roll being substituted for the second roll heated temperature of Fujimoto, but the surface roughness, the fact of the matter is that one skilled in the art would not randomly, without any teachings or suggestions to do so, take only the surface roughness to be applied to Fujimoto, but not the temperature teachings as well. This is particularly true in view of the fact that those skilled in the art are well aware of the effects that temperature can have on the fibers. One skilled in the art would have no reasonable expectation of success in utilizing a particular surface roughness from Rowan on a much hotter roll as taught by Fujimoto. Those skilled in the art would be well aware that the impact of utilizing the matte finish rolls would likely decrease as the temperature increases, especially as the fiber material

approaches glass transition/melting point temperatures.

In that regard, it must be remembered that it is impermissible in formulating an obviousness rejection to simply pick and chose random components from various publications simply to fill voids or gaps in the respective teachings of the publications. This is particularly true when there are directly divergent teachings that are relevant to the portions that are the subject of the random selection. This is even more true when the relevant teachings as to claimed portions of components in two references are in direct conflict with one another such as is the case herein. In any event, the selection of various pieces from Fujimoto, Rowan and Toshio are at best nothing more than "obvious to try", especially under the divergent teachings mentioned above. Of course, the Federal Circuit banned "obvious to try" many years ago. Thus, there must not only be teachings and suggestions to make the modifications to the primary reference, but also a reasonable expectation of success that if the modification were to be made, the objective would be achieved. In this case, the Applicants do not believe that the directly divergent teachings between Rowan and Fujimoto with respect to the second roll would lead one skilled in the art to believe that there would be a reasonable expectation of success. For all of the above reasons, the Applicants respectfully submit that one skilled in the art would not make the hypothetical combination. Withdrawal of the rejection is respectfully requested.

The Applicants respectfully submit that there is in any event a further problem wherein even if all three references are combined, the resulting methodology would still fail to teach or suggest the claimed subject matter. In particular, the Applicants claim a surface roughness of 1.5 S to 8 S. The rejection helpfully points out that 1.5 S to 8 S is equivalent to 0.8 – 6.3 microns as set forth in the Applicants' Specification on page 14. The Applicants agree. On the other hand, the surface finish value of the Rowan rolls is between 35 and 120 microinches, which is 0.89 - 3.0 microns.

The problem with this approach is that it is substitution of apples for oranges and not a

substitution of apples for apples.

The Applicants point out that the surface roughness is defined on page 14 as the maximum height which is (R_{max}). This is defined in JIS B0601. This is, however, sharply contrasted to the surface finish values (R_a) which are the arithmetic mean roll surface roughness value. These are not the same values. The (R_a) value is an arithmetic mean, while the claimed surface roughness (R_{max}) is a maximum height measurement. Therefore, the Applicants respectfully submit that if one skilled in the art were to take the (R_a) values of Rowan and apply them to Fujimoto, the resulting methodology would employ rolls having (R_a) values. The problem is that this is not what the Applicants claim. The Applicants claim (R_{max}) values which are directed to maximum height. These do not correlate and, as mentioned above, are apples and oranges. Therefore, the Applicants respectfully submit that a hypothetical combination of any or all of Toshio, Rowan and Fujimoto still fails to teach or suggest the subject matter of the rejected claims. Withdrawal of the rejection is respectfully requested.

In light of the foregoing, the Applicants respectfully submit that the entire application is now in condition for allowance, which is respectfully requested.

Respectfully submitted,

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